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THE OCCUPATIONAL HEALTH HAZARDS FACED BY THE WORKERS OF SMALL SCALE DYEING UNITS

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ABSTRACT

Colour is the main attraction of any fabric. No matter how excellent its constitution is, if unsuitably coloured, it is bound to be a failure as a commercial fabric. Textile is one of the leading industries in the world. India has a long and rich tradition of producing a variety of textiles. The textile industry is the second largest industry after agriculture in terms of number of persons employed. It gives multi-directional contribution to the domestic economy. It employs around 38.11 million people or employing almost 25 per cent of the country's labour force. There are approximately more than 2500 textile units in India. The fabric processing sector (dyeing and finishing) - the weakest link in India's textile supply chain, consists of a large number of small units located in and around the power loom and handloom sectors.

Occupational health is an important concern of the working persons. The industry is one of the occupations which affects the health of workers. In fact, the objective of an occupational health service is not only to keep the workers physically healthy, but also mentally and psychologically stable. There is thus, a need to have a look on the occupational health of workers, so that they can remain healthy and perform the task carefully. There are numerous health and safety issues associated with the textile industry. These include chemical exposure, exposure of cotton dust, organic dust and noise exposure.

KEYWORDS: Chemicals, Dyes, Dyeing Units, Gloves, Masks, Occupational Health Hazards & Textile Industries

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Original Article

INTRODUCTION

The textile industry is one of the oldest, largest and most global industries in the world. It is not only the oldest, but also highly complex and competitive industry (Purushothama, 2015). India is the world's second largest producer of textile and garments after China.

Occupational Hazards are basically the risks, unpleasant experiences or accidents that take place in a workplace as a result of physical, biological, chemical, psychosocial conditions (Mishra, 2018). Each Occupational disease and injury has a major effect on the economy due to loss of productive hour, man-power losses and compensation to the victims. In order to reduce all occupational diseases, injuries/fatalities, corrective and preventive measures should be taken (Kumar et al., 2015).

Millions of workers face different health hazards as they don't use safety wears, consequences of which are not at all aware of by them. The main entry routes of dyes and chemicals into their body are mouth, nose, ear, skin, hands and feet. Most of the workers suffer from problems like respiratory, eye, skin and musculoskeletal.

Dyeing is an old process of colouring the fabrics. With the increase in population, demand and technology, the process of dyeing is now mechanised. In dyeing, different kinds of dyeing products are used, which are hazardous in nature and every dye has a different impact on workers' health when exposed to the environment. During work, workers feel unhealthy due to the effect of the surrounding environment and activity of the process. So, there is a great concern that they should be aware of the adverse effects of dyes if not handled properly as they are exposed to the same with no control over the length and frequency of exposure. The exposure of workers to different types of chemicals causes different types of diseases like skin allergies, respiratory diseases and musculoskeletal disorders (Bansal and Yadav, 2016). Materials and chemicals used for production of fabric cause deterioration of ecological balance, for example, over-usage of natural resources like plants for the extraction of dyes and water in high amounts. (Akarslan and Demiralay, 2015).

METHODOLOGY

The current study provides an outlook towards the health hazards prevalent in the small scale dyeing units in Delhi and NCR. It deals with several health issues like respiratory problems, eye problems, skin problems, musculoskeletal disorders, etc.

- **Locale of the Research**

The research aims to study occupational health hazards of the dyeing workers in dyeing units in Delhi and NCR. Under this study, a sample size of 50 workers was studied by visiting six small scale dyeing units.

Sampling Procedure

- **Selection of Dyeing Units**

For present research, purposive sampling technique was used to select the dyeing units. To study the impact of dye and chemicals on the health of dyeing workers, various dyeing units of Delhi NCR were selected.

- **Selection of Dyeing Workers**

In the dyeing units, different processes included sizing, scouring, mercerising, bleaching, dyeing and finishing. To study the impact of dyes on the health of dyeing workers who were involved in pre-treatments, dyeing and finishing, they were randomly selected, considering that they should have been working in the units for at least 2 years. Thus, a total of 50 workers were selected for the investigation.

Development of Tools

In order to obtain the required information from the respondents, an interview schedule was prepared to study the health problems (as shown in Figure 1). This includes:

- **General Information:** The general information aimed at collecting data on the personal profile of the respondents.
- **Specific Information:** The specific information on the other hand, aimed at collecting information regarding various aspects of health hazards in the small scale dyeing units.

- Pre-testing of the tools was done to check the clarity of language and its practicability/applicability in field situation. The observation and interview schedules for all the sample categories were duly pre-tested and were finalised after making modifications.

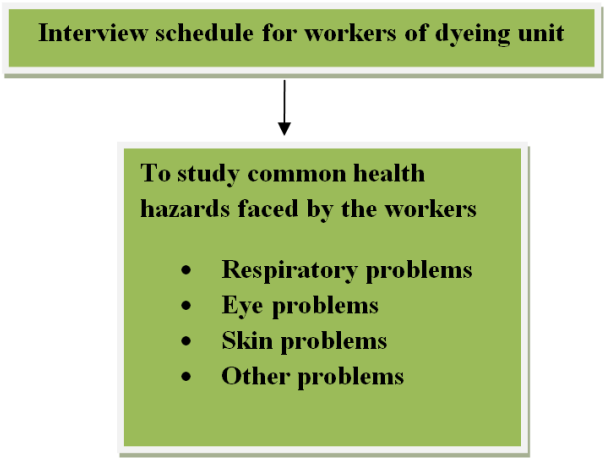

Figure 1: Collection of Primary Data through Interview Schedule

Collection of Data

Primary data was collected through personal visits to six small scale dyeing units, in and around Delhi NCR. The interview was conducted among 50 workers.

RESULTS AND DISCUSSIONS

- **Personal Profile of the Workers of Small Scale Dyeing Units**

Personal profile of the workers of small scale dyeing units included their age, sex, work period and educational background. Analysis of the results on these aspects is tabulated in Table 1. Out of the total sample of 50 workers, maximum respondents (80%) were male members. The majority of workers belong to 26-35 year of age group followed by 36-45 year old. As far as their educational qualification is concerned, (16%) were illiterate, (14%) attained primary education, and (54%) got secondary education, while (16%) were educated at the secondary level. The study also revealed that (14%) of dyeing unit workers have been working since past 10 years in the small scale dyeing units and were working in 12 hours shift (Table1).

Table 1: Personal Profile of the Workers of Dyeing Units

Personal Characteristics	Total No. of Workers, n=50	Percentage (%)
Age		
Up to 25 years	06	12
26-35 years	22	44
36-45 years	11	22
46-55 years	08	16
55 above	03	6
Gender		
Male	40	80
Female	10	20
Educational Qualification		
Illiterate	08	16
Primary education	07	14

Table 1: Contd.,		
Secondary education	27	54
Senior secondary education	08	16
Work Period in this Field		
Less than 2 years	00	0
2-5 years	32	64
6-10 years	11	22
More than 10 years	07	14
Activities Involved		
Pre-treatment	17	34
Dyeing	17	34
Finishing	16	32
No. of Shifts		
8hr	5	10
10 hr	12	24
12 hr	33	66
Smoker	10	20
Non-smoker	40	80

- **Occupational Health Hazards Faced by the Workers of Small Scale Dyeing Units**

In the present research, an attempt was made to study the health problems of the workers of all the departments, working in small scale dyeing units and results for the same are tabulated in Table 2. It was studied under the following heads:

- **Respiratory problems**
- **Skin problems**
- **Eye problems**
- **Any other problem**

Table 2: Health Problems Faced by the Workers of Small Scale Dyeing Units

Health Problems		YES N=50 (%)	NO N=50 (%)
Respiratory Problems			
a)	Cough	20 (40)	30 (60)
b)	Running nose	9 (18)	41 (82)
c)	Coughing up mucus or blood	0 (0)	50 (100)
d)	Dry or sore throat	10 (20)	40(80)
e)	Frequent colds	10 (20)	40 (80)
f)	Chest pain	3 (6)	47 (94)
g)	Wheezing	4 (8)	46 (92)
h)	Any other	0 (0)	50 (100)
Skin Problems			
a)	Redness	3 (6)	47 (94)
b)	Infection	0 (0)	50 (100)
c)	Rashes	10 (20)	40 (80)
d)	Pain full itching	10 (20)	40 (80)
Eye Problems			
a)	Itching	15(30)	35 (70)
b)	Redness	5(10)	45 (90)
c)	Watering	8 (16)	42 (84)
d)	Swelling	0 (0)	50 (100)

Table 2: Contd.,			
e)	Pain	12 (24)	38 (76)
f)	Vision change	12 (24)	38 (76)
	Any Other Problems		
a)	Headache	15 (30)	35 (70)
b)	Dizziness	5 (10)	45 (90)
c)	Drowsiness	35 (70)	15 (30)
d)	Stomach aches	15 (30)	35 (70)
e)	Loss of appetite	9 (18)	41 (82)
f)	Nausea	0 (0)	50 (100)
g)	Weakness	25 (50)	25 (50)
h)	Irritability	9 (18)	41 (82)
i)	Nervousness	4(48)	46 (92)
j)	Swelling of arms, legs and joint	13 (26)	37 (74)
k)	Backache	19 (38)	31 (62)
l)	Pain in joints	19 (38)	31 (62)
m)	Muscle cramp	7 (14)	43 (86)

Respiratory Problems

Industries serve as the major reason for the generation of gases, fumes, dust and other harmful substances, highly affecting the respiratory tract. The problem of respiratory irritants and inhaled toxic chemicals is common; many workers exposed to chemicals. These compounds cause harm by a variety of different mechanisms, and the extent of injury can vary widely, depending on the degree of exposure and on the biochemical properties of the inhalant (Klemola, 2008).

In the present study, the respiratory-related problems faced by the workers of the small scale dyeing units included cough, running nose, dry/sore throat and frequent cold (Table 3).

Chlorine gas released during bleaching causes severe irritation of the respiratory tract. There are some evidences that some reactive dyes cause occupational asthma or other allergic reactions in workers (Christie, 2007).

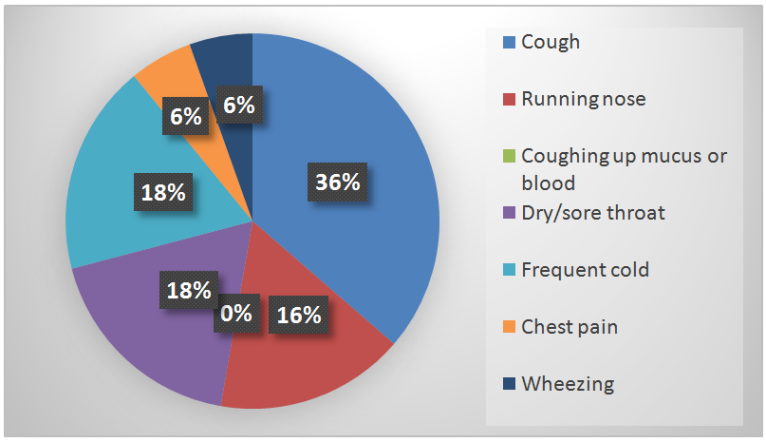

Figure 2: Respiratory Problems in Percentage Faced by the Workers in Small Scale Dyeing Units

Figure 2 shows respiratory problems in various processing unit of small scale dyeing units. In the present research, coughing (36%) was highly common among the respondents. It may be due to inhalation of chemicals, solvents during dyeing. Inhalation of caustic soda during desizing, scouring, bleaching and mercerizing may affect the respiratory system, or it could be due to their smoking habits. 20% of the workers were smokers (10 out of 30 males had smoking habit outside the unit). Respondents have reported dry/sore throat and frequent cold equally (18%) and running nose

(16%). Further, chest pain (6%) and wheezing (6%) were also reported by the respondents. Coughing up mucus or blood were not at all reported by any of the respondents. The work area was made of brick in one of the units because of which dust was maximum.

Table 3: An Overview of Respiratory Problems in Various Processing Units

S. No	Respiratory Problem	Pre-Treatment Processing Unit (%)	Dyeing Processing Unit (%)	Finishing Processing Unit (%)
1.	**Cough**	47	41.1	31.2
2.	**Running nose**	17.6	23.5	12.5
3.	**Coughing up mucus or blood**	0	0	0
4.	**Dry/sore throat**	29.4	23.5	6.25
5.	**Frequent cold**	41.1	5.8	12.5
6.	**Chest pain**	11.7	0	6.25
7.	**Wheezing**	17.6	0	0
8.	**Any other**	0	0	0

Respiratory Problems among the Workers of Pre-Treatment Processing Unit

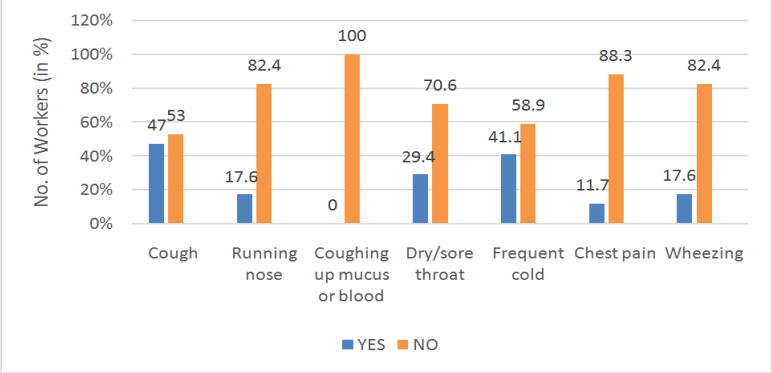

Figure 3: Respiratory Problems among the Workers of Pre-Treatment Processing Unit

In pre-treatment processing unit, the majority of workers were suffering from cough (47%). The reason may be due to inhalation of caustic soda and other chemicals, while coughing up mucus or blood was not at all reported by respondents. Figure 3 clearly depicts the problem of frequent cold (41.1%) and dry/sore throat (29.4%). Few workers reported running nose (17.6%) and wheezing (17.6%). Some of the respondents (11.7%) reported chest pain.

Respiratory Problems among the Workers of Dyeing Processing Unit

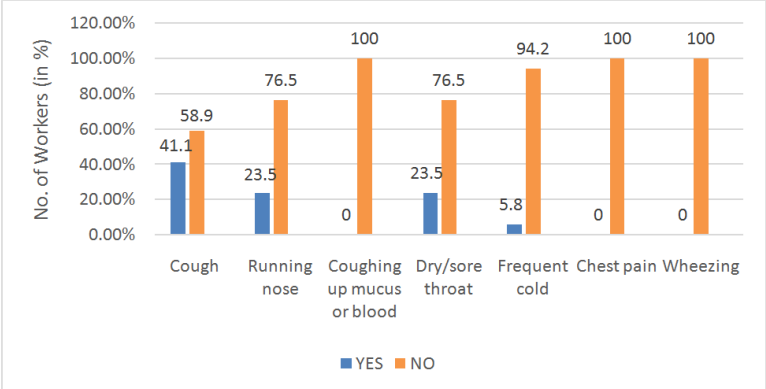

Figure 4: Respiratory Problems among the Workers of Dyeing Processing Unit

In dyeing processing unit also, the majority of workers were suffering from cough (41.1%). The reason may be due to inhalation of chemicals, while coughing up mucus or blood, chest pain and wheezing were not at all reported by respondents. Figure 4 depicts the problem of dry/sore throat (23.5%). Some of the respondents reported running nose (23.5%). The least likely to occur problems were frequent cold (5.8%).

Respiratory Problems among the workers of Finishing Processing Unit

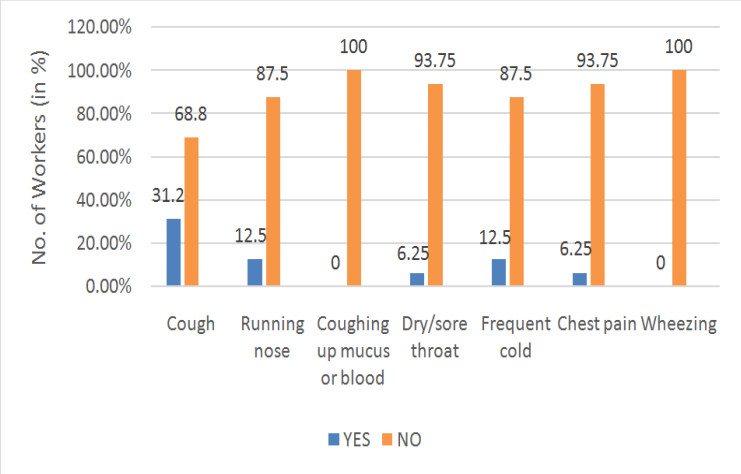

Figure 5: Respiratory Problems among the Workers of Finishing Processing Unit

In finishing processing unit, the majority of workers were suffering from cough (31.2%). The reason may be due to inhalation of dust because it was a dust-prone area (**Figure 6**). Therefore, it is advisable to wear a mask (**Figure 7**) which reduces the chances of catching respiratory problems. While coughing up mucus or blood and wheezing were not at all reported by respondents, (6.25%) workers reported dry/sore throat and chest pain. Running nose and frequent cold have shared the same percentage (12.5%) as shown in Figure 5.

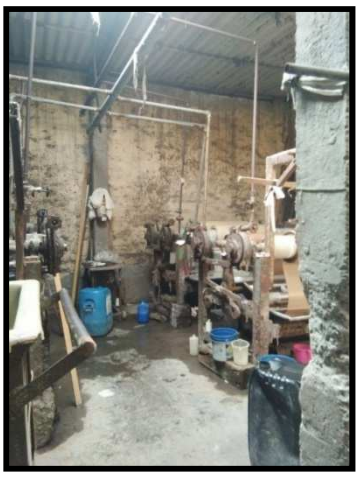

Figure 6: Dust-Prone unit Causing Cough

Figure 7: Worker using a Mask

Skin Problems

Skin is a very sensitive part of the living being and thus it is highly prone to hazards in several ways. Textile workers are at high risk for skin disease due to nature of their work. The dyeing procedure directly exposes workers to various dyes and chemicals. Skin diseases, such as allergic contact dermatitis, irritant dermatitis and inflammation of

mucous membranes, result from contact with dyes and chemicals. Dyes containing anthraquinone or azo structures are known to cause contact dermatitis (Klemola, 2008).

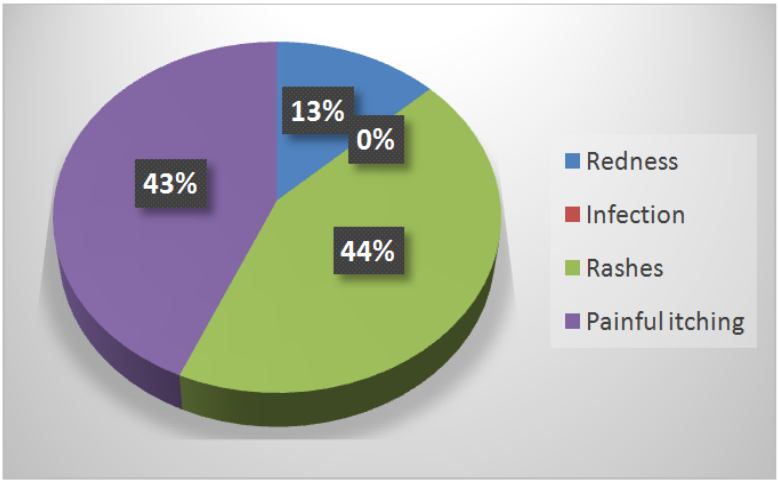

Figure 8: Skin Problems in Percentage among the Workers of Small Scale Dyeing Units

In the present study, number of skin problems was found like redness, rashes and painful itching since gloves (**Figure 9**) and shoes (**Figure 10**) were not being used by most workers. Figure 8 show prevalence of skin problems in the various departments. It was found that painful itching (48%) was most common among the respondents. Few workers reported suffering from rashes (40%), while redness (12%) were reported by the workers. Table 4 shows an overview of skin problems in dyeing unit.

Figure 9: No use of Gloves while Working with Dyes and Chemicals

Figure 10: Working without Boots/Shoes

Table 4: An Overview of Skin Problems in Various Processing Unit

S. No	Skin Problem	Pre-Treatment Processing Unit (%)	Dyeing Processing Unit (%)	Finishing Processing Unit (%)
1.	**Redness**	5.8	11.7	0
2.	**Infection**	0	0	0
3.	**Rashes**	23.5	35.2	0
4.	**Painful itching**	17.6	41.1	0

Skin Problems among the Workers of Pre-Treatment Processing Unit

Due to working with chemicals without gloves, skin irritation was found among workers. The workers from the pre-treatment processing unit have not reported any kind of infection. However, as shown in Figure 11, some of the workers reported rashes (23.5%), painful itching (17.6%) and redness (5.8%).

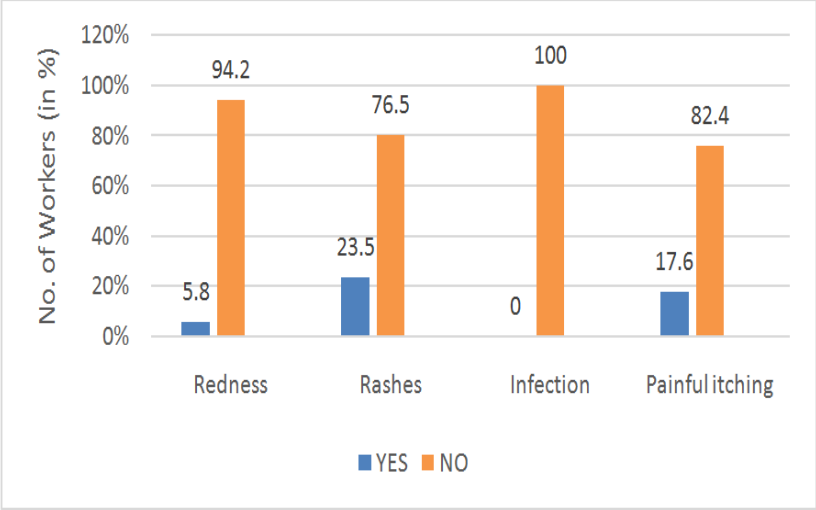

Figure 11: Skin Problems among the Workers of Pre-Treatment Processing Unit

Skin Problems among the Workers of Dyeing Processing Unit

Due to working with dyes and chemicals without gloves, skin irritation was found among workers. The workers from the dyeing processing unit have not reported any kind of infection. However, as shown in Figure 12, most of the workers reported painful itching (41.1%), rashes (35.2%) and redness (11.7%).

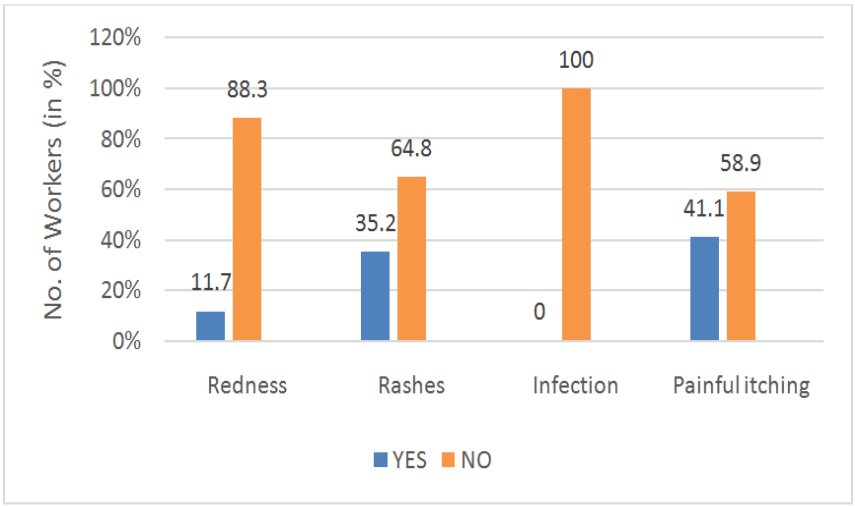

Figure 12: Skin Problems among the Workers of Dyeing Processing Unit

Skin Problems among the Workers of Finishing Processing Unit

The workers of finishing processing unit have not reported any kind of redness, infection, itching and rashes (Figure 13).

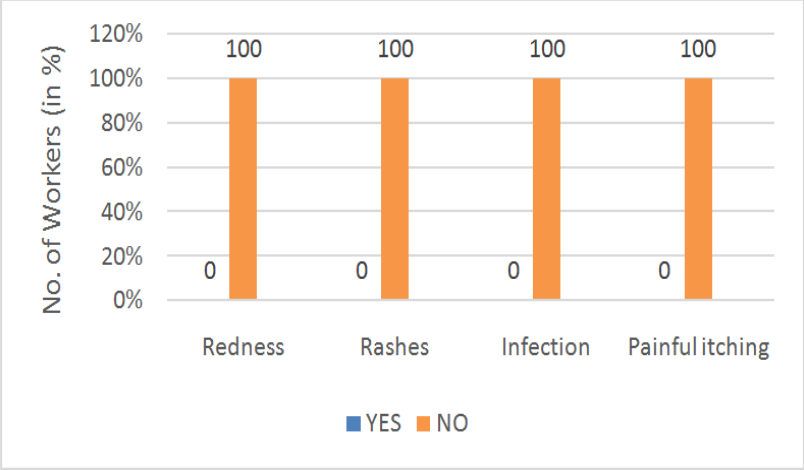

Figure 13: Skin Problems among the Workers of Finishing Processing Unit

Eye Problems

A study reported that the health problems of women working in a textile unit Coimbatore revealed that working for long hours cause eye strain, and 45% of the workers reported eye problem (Thomas, 2003). Thus the major reason for the eye problems is the long working hours near the boiler. Other than that, pre-treatment and dyeing department has chances of eye-related injuries due to chemicals while finishing department may face problems due to lack of light sources that causes strain in the eyes. Smith et al., (1994) reported that formaldehyde used during finishing could cause eye irritation.

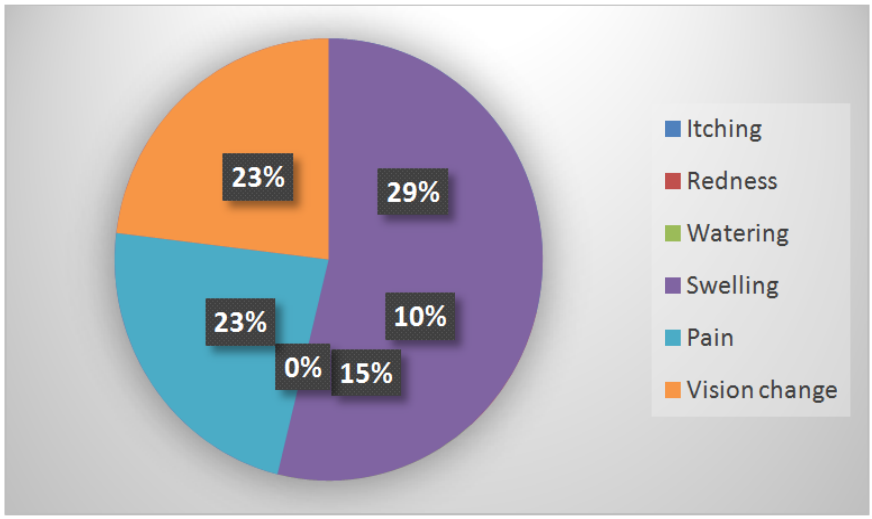

Figure 14: Eye Problems in Percentage Faced by the Workers of Small Scale Dyeing Units

The survey results reported the occurrence of a number of eye problems in the dyeing unit. The problems like vision changes, pain, watering, itchiness and redness are common among workers. Figure 14 shows that itching of eyes (29%) was the most common eye problem in the units. Vision changes (23%) and pain (23%) were also reported by the workers. The problem which does not occur among the workers were swelling in the eyes. Table 5 shows an overview of eye problems in dyeing unit.

Table 5: An Overview of Eye Problems in Various Processing Unit

S. No	Eye Problem	Pre-Treatment Processing Unit (%)	Dyeing Processing Unit (%)	Finishing Processing Unit (%)
1.	**Itching**	41.1	41.1	6.25
2.	**Redness**	11.7	11.7	6.25
3.	**Watering**	29.4	17.6	0
4.	**Swelling**	0	0	0
5.	**Pain**	47	11.7	12.5
6.	**Vision changes**	41.1	23.5	6.25

Eye-Related Problems among the Workers of Pre-Treatment Processing Unit

Working with chemicals, the workers' eyes get itchy and due to long working hours, they develop strain in their eyes. Also, when the workers are discarding waste in the boiler, their eyes are affected due to the hot air produced within the boiler, which causes pain, watering of the eyes and changes in the vision (**Figure 18**). The workers wear gloves while putting the waste into the boiler, but they do not wear safety glasses which is very necessary for them (**Figure 19**). The safety glasses are available but they do not wear due to careless nature. There were a number of chemicals used in the pre-treatment processing unit.

The results had shown 47% workers having pain followed by workers having itching (41.1%) and vision changes (41.1%). None of the workers reported suffering from any kind of swelling and few had reported watering (29.4%) and redness (11.7%) as shown in Figure 15.

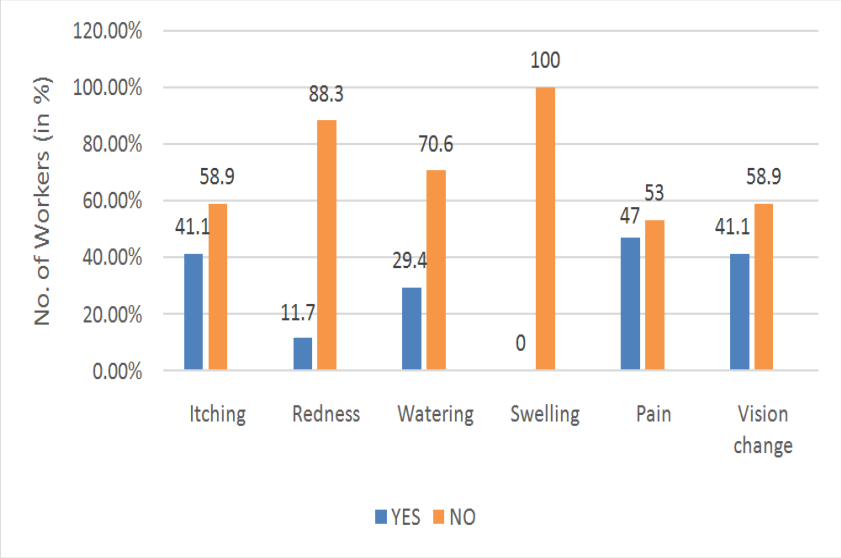

Figure 15: Eye Problems among the Workers of Pre-Treatment Processing Unit

Eye-Related Problems among the Workers of Dyeing Processing unit

There were a number of dyes and chemicals used in the dyeing processing unit. As shown in Figure 16, itching (41.1%) was reported as the most evident eye problem in the dyeing processing unit due to working with dyes and chemicals and working for long hours. Watery eyes (17.6%) were reported by the respondents. Some workers reported having vision changes (23.5%) while both redness and pain have shared same percentage (11.7%).

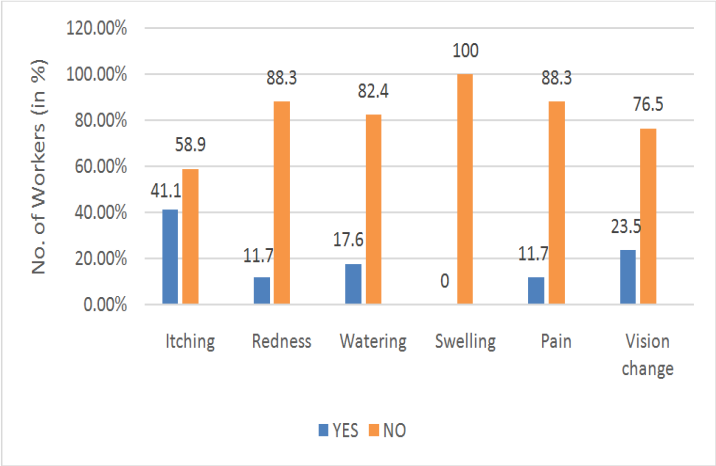

Figure 16: Eye Problems among the Workers of Dyeing Processing Unit

Eye Related Problems among the Workers of Finishing Processing Unit

In the finishing processing unit, few respondents reported pain in eyes (12.5%) due to long working hours and due to working in low light. Itching, redness and vision change have been reported by (6.25%) of workers as shown in Figure 17.

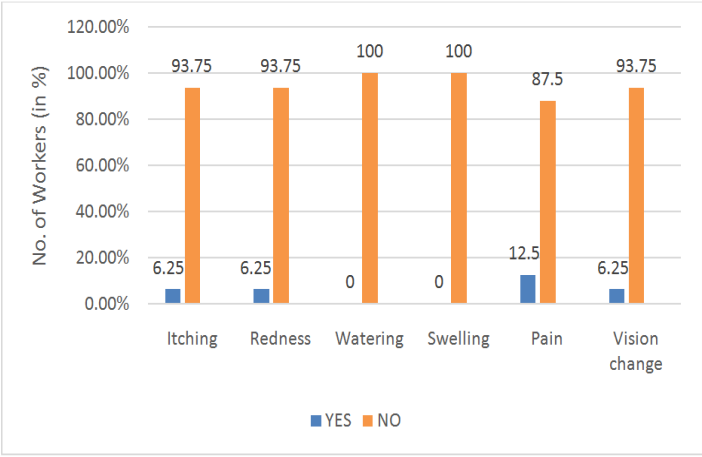

Figure 17: Eye Problems among the Workers of Finishing Processing Unit

Figure 18: Eye Problem due to Working without Safety Glasses near the Boiler

Figure 19: Provision of Gloves while Discarding Waste into Boiler but no Provision of Safety Glass

Any Other Problems

In the dyeing units, as per the activities and the working conditions, few other hazards were found prevalent. As per Figure 22, (70%) of the health problems reported were of drowsiness. Other problems among the workers of dyeing units were headache, stomachache, backache (**Figure 20 and 21**), pain of the body, weakness, loss of appetite and dizziness, etc. Table 6 shows an overview of other problems in dyeing unit.

Figure 20: Wrong Posture

Figure 21: No Provision of Chairs with Back Rests

Table 6: An Overview of other Problems in various Processing Unit

S. No	Other Problems	Pre-Treatment Processing Unit (%)	Dyeing Processing Unit (%)	Finishing Processing Unit (%)
1.	**Headache**	23.5	35.2	31.2
2.	**Dizziness**	11.7	17.6	0
3.	**Drowsiness**	70.5	70.5	68.75
4.	**Stomach ache**	41.1	35.2	12.5

Table 6: Contd.,				
5.	**Loss of appetite**	23.5	29.4	0
6.	**Nausea**	0	0	0
7.	**Weakness**	70	52.9	25
8.	**Irritability**	23.5	29.4	0
9.	**Nervousness**	11.7	5.8	0
10.	**Muscle cramp**	23.5	17.6	0
11.	**Swelling of arms, legs, joints**	23.5	23.5	31.25
12.	**Backache**	35.2	35.2	43.75
13.	**Pain in joints**	35.2	35.2	43.77

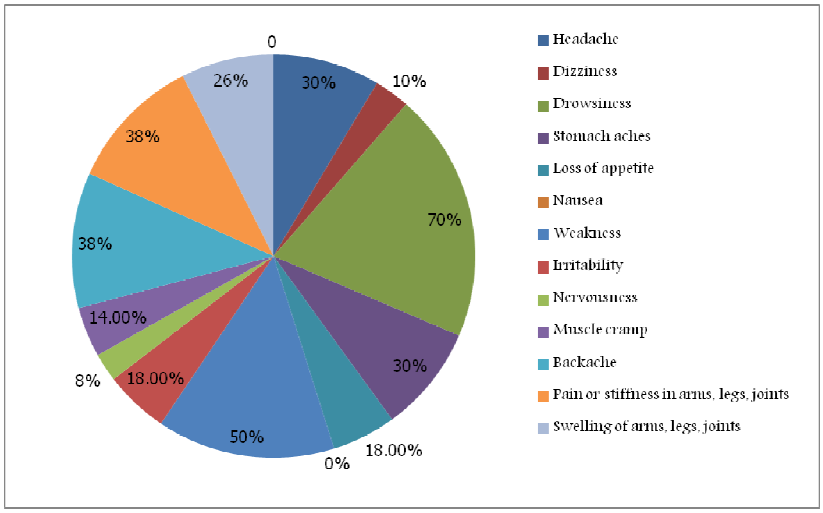

Figure 22: Other Problems Faced by the Workers of Dyeing Units

Other Health Problems in Percentage among the Workers of Pre-Treatment Processing Unit

In the pre-treatment processing unit, there were many health hazards prevalent among the workers as shown in Figure 23. Maximum respondents have reported the problem of drowsiness (70.5%) followed by weakness (70%). The reason could be long working hours and repeatedly doing the same process. It could be due to lifting the fabric and not taking proper rest.

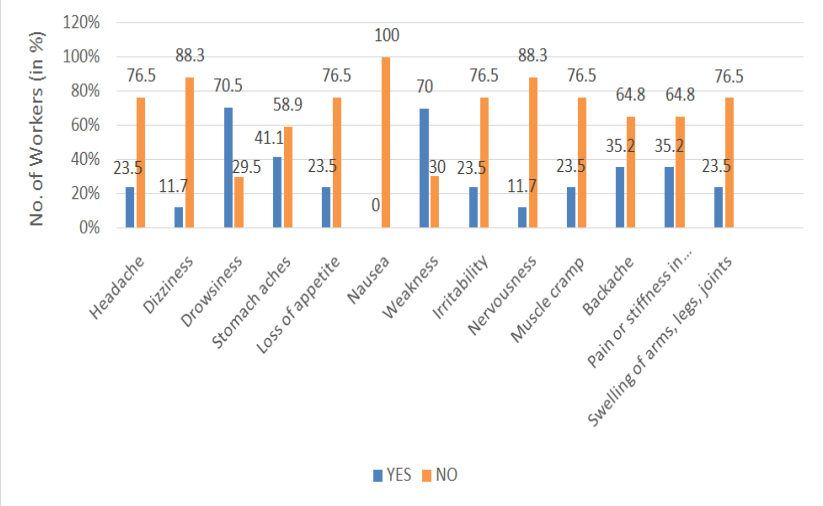

Figure 23: Other Problems among the Workers of Pre-Treatment Processing Unit

Other Health Problems among the Workers of Dyeing Processing Unit

In the dyeing processing unit, there were many health hazards prevalent among the workers as shown in Figure 24. Maximum respondents have reported the problem of drowsiness (70.5%) followed by weakness (52.9%). The reason could be long working hours and continuously doing the same process again and again without taking any proper rest. Headache, stomach ache, backache, pain in legs, joints have shared same percentage (35.2%).

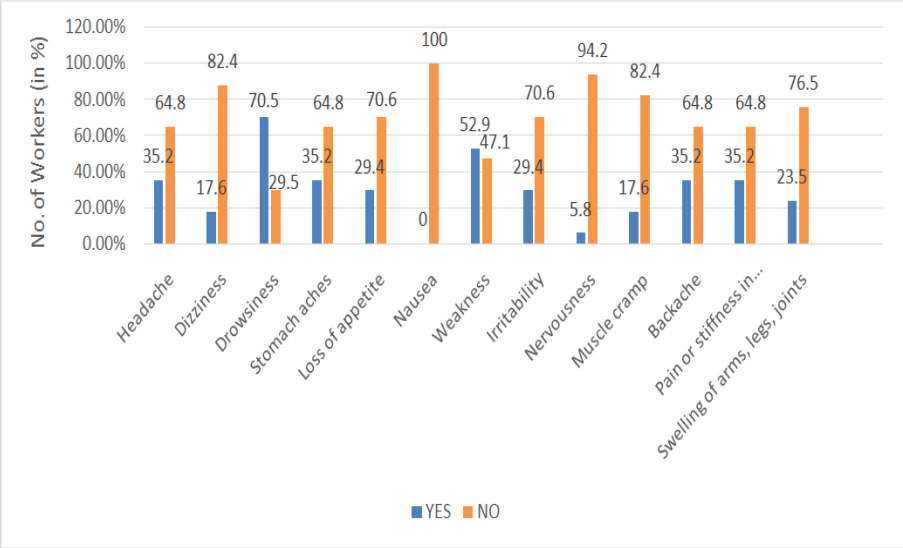

Figure 24: Other Problems among the Workers of Dyeing Processing Unit

Other Health Problems among the Workers of Finishing Processing Unit

In the finishing processing unit, there were many health hazards prevalent among the workers as shown in Figure 25. Maximum respondents have reported the problem of drowsiness (68.75%) followed by backache (43.75%) and pain (43.75%). Few workers have reported swelling of legs (31.25%). There was no complaint of dizziness, nausea, loss of appetite, muscle cramp and irritability.

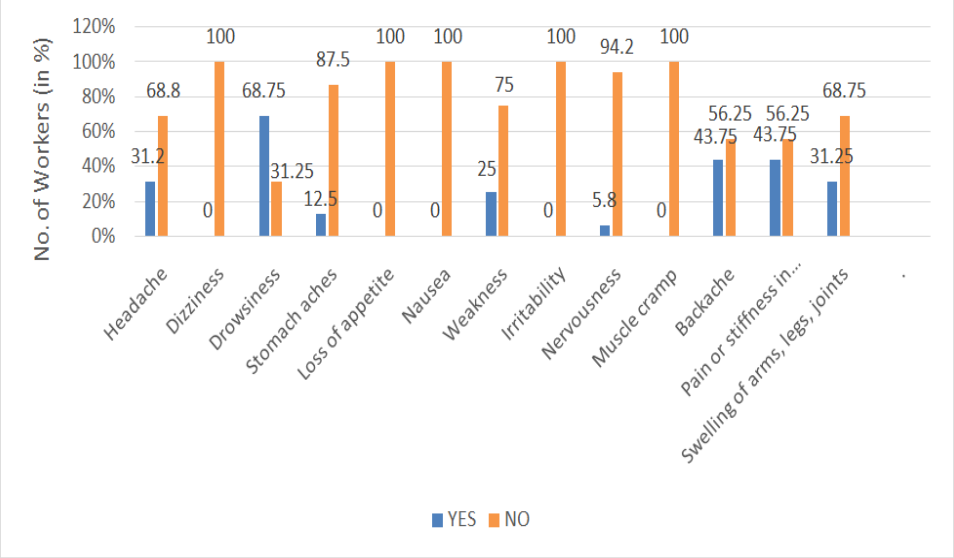

Figure 25: Other Problems among the Workers of Finishing Processing Unit

CONCLUSIONS

The presence of chemicals and dyes in the workplace can be unpleasant and distracting. The workers of dyeing units are exposed to a number of dyes and chemicals which can be carcinogenic. Exposure to different chemicals may give rise to long-term diseases among workers. Formulation and use of alternative non-toxic textile chemicals for different processes should be encouraged. The workers should be warned in order to make it compulsory to wear protective equipment or the owner should deduct the salary of workers if they show their carelessness nature towards it. It aims at minimizing the frequency of the occurrence of these hazards and to provide better norms to enhance the living conditions of the workers.

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